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ABSTRACT

Ethnographic methods were used to study interactions between a college instructor and his class. The data collection methods included classroom observations, videotape recordings, interviews, and questionnaires. The focus of the study was on co-occurring behavior patterns in student-teacher interactions during a "subject matter loop" (when the instructor was concerned with the students' understanding of and participation in the subject matter). A transcript was made of a segment of a college instructor's mathematics instruction. Analysis of the transcript and the accompanying verbal and nonverbal behaviors shows an instructional sequence composed of: (1) focusing the students' attention; (2) presenting information and stimulating thought; (3) revealing the "punch line," or the essential point of the instruction; (4) stressing the importance of the mathematical operation and directing students' attention; (5) commenting and reducing anxiety about the operation; and (6) summarizing and reaching closure. Students reviewing the videotape recognized the instructional techniques of slowing down the pace of instruction, using analogies, repeating, and using gestures. A more detailed analysis of the same videotape and another segment was used to compile information on the frequency of the instructor's various body positions, direction of gaze, gestures, and position in the room. Students interpreted the teacher's use of space as contributing to the learning process and recognized the co-occurring behaviors that signaled a particularly important point. The study supports the findings of other ethnographic research and suggests that the situationally determined and socially negotiated classroom roles can be analyzed in terms of their focal activity. (FG)

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AN ETHNOGRAPHIC STUDY OF TEACHING STYLE

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SP 019 038

An Ethnographic Study of Teaching Style

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College teaching is an interactive dynamic process. Teaching is a composite of what information is to be conveyed and how that information is transmitted. It is an integration of instructor and student perceptions, interpretations of those perceptions, and subsequent decisions based on those interpretations. Teaching is a shifting of roles, or ways of going about accomplishing the task at the moment, to achieve a desired end. To effectively orchestrate the multidimension process we call teaching is not easy. It is also not easy to understand how master teachers accomplish this feat.

We need to know more about these interactive dynamics of college instruction. We need to address questions such as: "How does an instructor present information in order to facilitate learning? What behaviors do classroom participants monitor and how are these behaviors interpreted? How do behaviors manifest themselves verbally and non-verbally? How can this information be of use to other researchers and instructors?"

The following is part of a study that used ethnographic methods to study classroom interactions. The aspect of the class that is explored is what the instructor referred to as "the subject matter loop". An overview of the "subject matter loop" will be provided and two stages of analysis presented. First, the transcript and accompanying behaviors will be illustrated, interpreted and summarized. Second, a more detailed analysis based on nonverbal and discourse analysis will be made.

METHOD

Subjects

A college instructor was selected for study based on recommendations from his colleagues and students; he was considered to be an effective, successful teacher. The instructor and his class were studied for two ten-week terms; fall, 1977, and winter, 1978. The course, Discrete Time Systems, is a basic, required course in Electrical Engineering and Systems Science at Michigan State University. Of the 47 students Fall Term and 43 Winter Term, the majority were juniors in electrical engineering.

Research Methods and Process

The purpose of this study was to examine and describe how an instructor and his students interacted in the classroom to attain their teaching and learning goals. In studies such as this investigative methods are selected that permitted access to on-going classroom behaviors and the interpretation of those behaviors from the perspectives of the instructor, students and researcher. The approach is based on the ethnographic research of Wolcott (1973), Erickson (1976), McDermott (1977), Florio (1978) and Mehan (1978).

The research process is guided by broad, specific and even more specific questions. At each level of questioning data is collected, integrated and verified (Figure 1).

The questions asked determined the methods used. The data collection methods include classroom observations, observational notes, videotape recordings of class sessions, videotape viewing sessions with individual participants, interviews and questionnaires. An overview of the methods and findings are presented as they developed during the research process. (More detailed explanation and examples of methods are provided in the appendix.)

The initial, broad question asked was: "How do the instructor and students interact to realize their teaching and learning goals?" Classroom observations and observational notes were used. Conscious attempts were made to remain open to new information and patterns of behaviors. Based on initial observations, it appeared that the instructor's and students' interactions varied within each class session. At times he appeared to be presenting information much like a lecture. At other times he appeared to be working at initiating student involvement in the lesson. More specific questions were formulated:

> How does the instructor decide when to present information and when to initiate student participation in the lesson? What student behaviors does he consciously or tacitly monitor? What are the changes in his behaviors? When and how do these changes occur? What impact do his behaviors have on the instructional process?

To explore these questions, the participants' interpretations of behaviors were required. Videotapes of four class sessions, independent videotape review sessions and interviews supplemented the ongoing classroom observations. The videotape review sessions helped locate patterns of behaviors that had meaning to the participants. Based on this data a descriptive model of the instructional process and the instructor's decision guide was developed. It was possible to note the behaviors he monitored and interpreted and how he subsequently responded. It was also possible to relate meanings the students associated with the instructor's patterns of behaviors. More specific questions began to emerge.

> What are the specific behaviors that make up the patterns of behaviors that students identify as meaningful? What does the instructor do, both in talk and actions, to facilitate the students' understanding of the subject matter?

To address specific questions of this nature, a detailed analysis of the instructor's behaviors and classroom discourse was documented and examined. A transcript was made and behaviors were coded by two-second intervals.

FINDINGS

Overview of Class-Involvement and Subject Matter Loops

The class session had two interacting dimensions from the instructor's point of view: an "involvement loop" and a "subject matter loop". The involvement loop, in Dr. Goodman's terms, was based on the students' attention to and participation in the presentation of the subject matter. Intertwined with his efforts to involve the students in the instructional process was what he called the subject matter loop. The subject matter loop was based on the students' understanding of the content of the lecture. Part of the activities he talked about in both "loops" were preplanned and part were situational and based on the on-going instructional event. Examples of both "loops" have been studied in detail. (Cooper, 1979, 1981). An examination of the subject matter loop will be the focus of this paper.

The "Subject Matter Loop"

During the "subject matter loop" Dr. Goodman's efforts were focused on facilitating the students understanding of the subject. The discussion of the "subject matter loop" is based on two premises about instructional events: parts can be planned in advance and parts are created in the event itself. First, the "subject matter loop" was planned based on the chapters and units in the textbook, provided the more structured, referent information and was outlined on the overhead transparency. Second, the instructional process is in part situationally determined based on the instructor and the students monitoring the event as they determine what is going on. These on-the-spot instructional decisions are Dr. Goodman's means of working to modify or maintain the presentation of the subject matter.

The participants were able to monitor the event because behaviors are to some degree patterned and regular. The questions that are raised are: What behaviors are monitored in the event as being functionally relevant? and How do the instructor and students go about modifying the event if a change is desired?

One instructional episode that was commented on twice by Dr. Goodman and at least once by five of the six students was what Dr. Goodman referred to as "a mathematical punch line". Upon stopping the videotape Dr. Goodman said:

> This is a mathematical punch line... Now that I've been telling them they can use, can be used... Now I can say...Here's what you can do... I promised you...here it is... You only get a real punch line every other lecture in this class. A real pow... The students probably wonder why I'm so excited... They know I know the stuff...but I do (get excited)...

The mathematical punch line represented a culmination of a build-up of information on a simplified version of a grueling mathematical task. The students talked about the instructor's behaviors and the meanings they conveyed as he developed the "punch line". Based on these comments and information from various data gathering methods, the "subject matter loop" was further analyzed. The focus was on (1) co-occurring patterns of behaviors and (2) participant roles. First, Dr. Goodman's position in the classroom and accompanying behaviors were indices of a change in the lesson. The accompanying behaviors; Dr. Goodman's body position, gestures, direction of gaze and discourse will be analyzed for patterns of behavior that were referred to by the participants. Second, the various instructor roles will be examined using the pronominal usage as an indicator.

The analysis will be presented in two phases: I. the transcript and accompanying behaviors of the 100-second "mathematical punch line" will be presented, interpreted and summarized; II a more detailed analysis and interpretation of the patterns of behavior that appear to be functionally relevant to the participants will be made. The transcript and accompanying behaviors are shown on Table 1.

Table 1 Instructor's strategy to present subject matter. (I = Instructor, S = student) - Cooper 79

	Transcript from Videotape	Nonverbal Behaviors	Analysis of Discourse	Use of Pronoun
			Boundary Exchanges	
(1)	...Just look at this thing....	At the screen at angle to students.	Framing with marker (Just look at this...)	"I-you" - teacher-learne
	Let me raise it up for you a little bit.... Look at the form of it. We have the Z transform of the output... Right?...is equal to something here...times the Z transform of the inputs...times the Z transform of the inputs...right?	Raises transparency. Walks back to screen. At angle to students. at screen, looking at students. Stresses "times" vocally and with gestures. Begins to walk toward students.	"Typical Teaching Exchange" I - informs, clues (Times...), checks (Right?), informs	
(2)	Now...how did we know how to relate the outputs to inputs before.... What's the type of relationship been before?.... (Student responds.) Yeah...convolution summation... which is a colossal pain in the neck...true?... colossal....	Continues walking toward students, both arms up, palms up, gestures with hands as he talks more rapidly and excitedly.	I-marker (Now...) starter (What's the relationship) S-reply I-evaluates, comments, checks (true), comments	"We"
(3)	Now...what's the relationship now...	Turns slightly to point and look at screen.	I-marker (now) starter (what's the relationship now?)	
	Multiplication...Ah, boy...that's a vast improvement....	Faces students, arm still pointing to screen, throws head back.	information (multiplication), comment (vast improvement)	
(4)	Ok...That's why we do this thing.... That's the heart of why we use the Z transform.... Now...we multiply something instead of having	Gestures as walks back to screen. Looks at and points to screen while at the right edge.	I-marker (Ok) comments, checks (right),	
	to take two convolution summations which ya all know you have to run...you have to have two fingers and a toe to calculate...right. ...You run everything in all directions....	Walks toward students gesturing back and forth with his hands.		

Table 1 (Continued)

	Transcript from Videotape	Nonverbal Behaviors	Analysis of Discourse	Use of Pronou
(5)	This is a much nicer kind of operation. We can now talk about the ratio between output and input just by dividing this through by saying Y of Z is equal to this thing...and what is this thing?.... It's just some function of a complex variable, of Z. It's not nasty...it's just the relationship of the polynomials of Z...Big Deal...so this is much nicer and cleaner than having to do convolution summations....	Back to screen, gesturing to screen, looking at students and the screen. Moves to edge of screen, faces students, gestures. Walks toward students and front of platform.	I-comments, starter (What's this thing?) information, comment (It's not nasty, it's....)	
(6)	That's what we're driving at this for...just wanted you to see that thing...as you'll come to find out this thing right here is a perfectly good characterization of the whole system....	Walks back to table, looking at students, picks up transparency, continues gesturing. At edge of screen, angle to students, pointing and looking at the screen.	I-metastatement (that's what we're driving at this for) I-information	"I-You" - teacher-learn
(7)	If you know that...you can derive the difference equation...you can derive the weighting sequence ...you can derive anything you want with just that one simple thing. I think that's pretty neat....	Gestures rapidly as he walks to the front of the platform. Talks rapidly, excited, increased pitch and volume. Puts on new transparency. Tempo slows down, volume drops, normal speaking voice.	I-comments,	"I" - person

T, VT-1, 6:52-8:32, or approximately #170-200, 2/10/78)

Preliminary Analysis of Co-Occurring Behaviors

As this segment of the tape beings (1) Dr. Goodman is focusing the students' attention to the form of the equation, while referring to the equation as a "thing". He moves from the screen to raise the transparency saying "Let me (the instructor) raise it up for you (the students) a little bit... Look at the form of it!... (a starter, which informs or directs attention to an area to increase the likelihood of a correct response). Walking back to the screen he selectively reads the information, stressing verbally and with gestures, the distinguishing features of the equation. He provides the clue "Times the Z transform of the inputs," checks with the students, "Right?..."; and begins to walk toward them.

While walking toward the students (2) he gestures with both hands as he asks the students to think (a starter) of how they have related outputs to inputs before. At least one student answers aloud and Dr. Goodman confirms the answer. He comments that the previous strategy was difficult to do, and in fact "a colossal pain in the neck..."

The "punch line" is revealed (3) as he provides a starter, "What's the relationship now?...", glances at and gestures toward the screen from the front of the platform, then returns his gaze to the students. He focuses their attention on the screen but maintains eye contact. As he says "multiplication" he is directly facing the students with his arm suspended toward the screen, and his head goes back as if to accentuate the discovery. He goes on to stress, "That's a vast improvement!"

After the discovery is revealed (4), he stresses and explains why this is a vast improvement. He momentarily walks back to the screen to direct the students' attention to the equation, turns and walks toward the students. Midway between the screen and the front of the platform, he stops to illustrate with his fingers how the students previously had to "run everything in all directions," and checks the students with "Right?".

Dr. Goodman goes on to explain (5) why this is a "much (stressed) nicer kind of operation" and how the process is simplified. He makes a metastatement about purpose of the preceding exchange, "That's what we're driving at this for...just wanted you to see that thing...as you'll come to find out..." As he states this he walks back to the screen to point at "this thing," but as he explains its meaning, he returns to the front of the platform, closer to the students, gesturing as he moves.

He summarizes (6 and 7) while looking at the students and gesturing as he goes to get a new transparency. Moving to the front of the platform he again stresses why this is important, how it characterizes the whole system, and what they can now do with their new knowledge. As he puts on the new transparency, he closes with an aside, "I think that's pretty neat..."

A preliminary examination of the discourse suggests that Dr. Goodman initiates the exchange and (1) focuses the students' attention, (2) presents informations and stimulates thinking, (3) reveals the "mathematical punch line," (4) stresses the importance of the discovery and directs student attention, (5) comments and reduces anxiety, and (6 and 7) summarizes and reaches closure. These steps in the instructional process are produced verbally and nonverbally.

Prior to the more detailed analysis of this instructional epsiode, the student comments will be presented to document the meaning the episode had for them. Seven of the eight students who reviewed the videotape commented on the behaviors they used as indicators that something important was being presented. Dr. Goodman's behaviors included: slowing down, repeating concepts and statements, referring to prior learning, using analogies and gesturing. Other comments made by students were more interpretive, such as, he attempts to make students think, he tries to show the implication of the concept, he talks to the class, he tries to make it easier. For example:

> He's calling attention to something important (student gestures) with his hands, mimicking the instructor)... He slows down, repeats... "this is important"... (mimics the instructor's gestures and tone of voice)... "what's the only trick we have?" ... He calls attention to it ...
>
> He calks through the algebraic manipulations and says... "Stop ...look at what we have here..." He compares it to what we've learned before...he really attempts to make students think in class...slows down...says..."Stop...look at this material..."
>
> When he's really got something to say he makes analogies like "Use your fingers and toes"... Often the analogy is with a bad way...it's a way of putting the point across... He does this after he's told you once and is about to tell you again... He catches your attention...repeats a point... "That's the heart of why we do the convolution summation..." Then he comes back and says why this is so good...
>
> This must be important...he raised the transparency and is talking to the class...He's slowing down...he's about to ask a question...

The students were apparently able to interpret Dr. Goodman's behaviors and determine that important information was being presented.

A More Detailed Analysis of Co-Occurring Behaviors

To further examine the hunch that Dr. Goodman's behaviors formed regular patterns that could be oriented to and interpreted by the students, a more detailed analysis of two videotapes were conducted. The following steps were performed, and will be illustrated with the "mathematical punch line" segment of one videotape.

(1) a transcript of the "mathematical punch line" was produced in two-second intervals.

(2) The instructor's position in the room (P), body position (BP), gestures (G), and direction of gaze (DG) were recorded at corresponding two-second intervals. (See Code of Co-Occurring Behaviors, Appendix, Figure A5, Table

(3) A frequency count was made of the instructor's position in the room and corresponding body position, gestures, direction of gaze and discourse.

(4) The frequency counts were examined for patterns of co-occurring behaviors (figure 2).

(5) The instructor's position in the room and accompanying discourse was analyzed.

(6) The compiled information was cross-checked with the instructor's and students' comments concerning this segment of videotape, and with other information previously collected.

(7) Two other segments of videotape were analyzed to cross-check the findings from this segment of videotape. (Cooper, 1979, p. 317)

Step Four: a frequency count was made of the instructor's positions in the room during this segment of tape. These positions are illustrated in Figure 2.

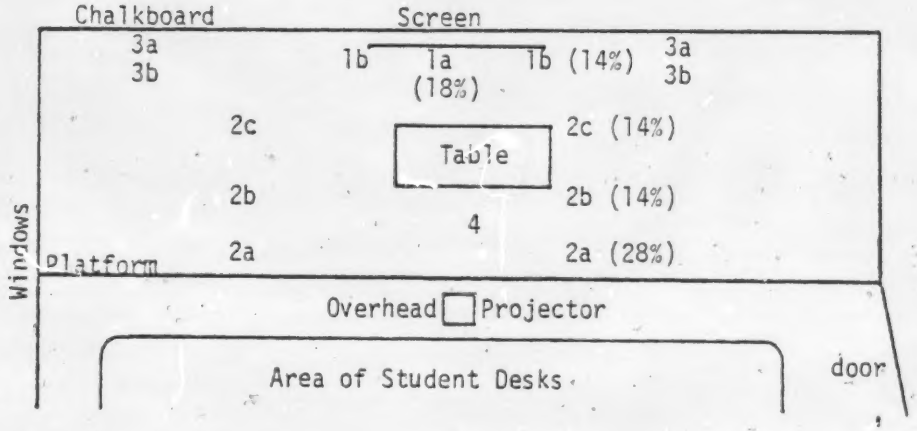


Figure 2. Instructor's positions in the room during "mathematical punch line."

Fifty-six percent of the total time during this 100-second segment of a class session was spent in position 2. Most of that time, 28 percent, was closest to the students. Thirty-two percent of the time was spent in the region of the screen, 18 percent (1a) was "at" the screen, and 10 percent (1b) to the right of the screen. Position 1b seems to be a composite position. The instructor stayed close to the screen (perhaps for a quick reference to the subject matter content), yet talked and acted in a manner typical of position 2. The frequency tables were examined for patterns of co-occurring behaviors. Table 3 represents a compilation of information from the videotape, interviews and video review sessions and observations.

Five: the discourse and behaviors were examined for changes. The following behaviors were noted.

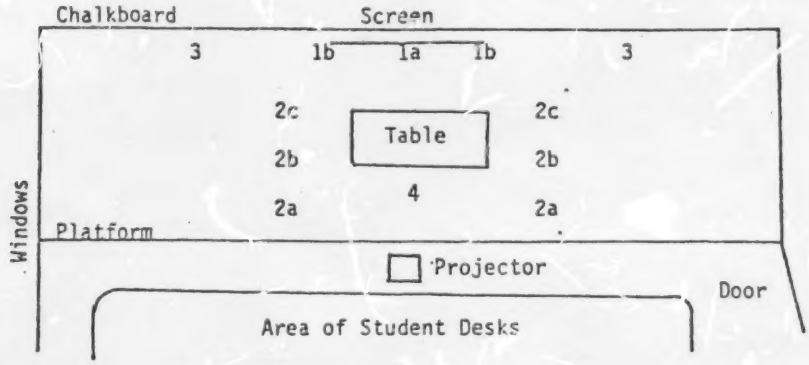
Dr. Goodman begins and basically ends this instructional episode in the role of the teacher-manager-expert. The episode begins (1) as he uses the screen as a referent saying: "Just look at this thing...look at the form of it..." He adds, "Let me (the teacher) raise it up for you (the students)..." The only other time the instructor goes to the screen (5) is to use the screen as a referent, "... just divide this thing through...what is this thing?..."

During the remainder of the instructional transaction the pronominal usage is "We"...i.e.,"...How did we know how to... That's why we do this thing... Now we multiply..." (The plural seems to indicate the joint effort of the instructor and students in the learning act.)

Dr. Goodman moves to the position closest to the students (2a) three times. First, (2 and 3) to reveal the mathematical punch line; second, (5) to point out that what initially appears difficult is "...not nasty..." and to reaffirm that "...this is much nicer...;" and third, (6) to make a personal comment,..."You can derive anything you want...I think that's pretty neat..."

TABLE 4 The instructor's use of space: A component of "instruction," a part of the descriptive model of the dynamics of the instructional process. (Cooper, 1979)

Dr. Goodman's use of space was interpreted by students. During instruction his use of space varied with what he was doing as he monitored, interpreted, and responded to students' behaviors.



Instructor's Use of Space, Winter Term, 1978

Position in the Room	Behaviors
At the screen (1a)	Presents basic structural content of course, selectively reads and points to information on screen. Looks at screen, asks rhetorical questions.
Closer to students (2 a, b, c)	Reflects on the logic of information, provides examples, asks questions which require and allow for an answer, uses colloquial phrases, models an experienced learner. Looks at students, increases frequency and intensity of gestures, varies volume and rate of speech. (Participants are more likely to stop the videotape to comment on the instructional process.)
By the screen (1b)	A composite of "at the screen" and "closer to students" behaviors. Develops, explains, illustrates, asks questions about meaning of concepts on the screen. Looks half the time at students and half the time at the screen. Students are more likely to respond to questions than if he is "by the screen."
At the chalkboard (3)	Explains difficult concepts, responds to students' questions, elaborates. Looks at the students and at the board. Similar to the "by the screen" behaviors.
By materials (4)	Organizes, passes out, collects or selects materials.

As the episode ends (7), Dr. Goodman moves to the transparency and the I-you role of the teacher-expert as he says, "...I just wanted you to see that thing... As you'll come to find out... If you know that...you can derive..."

In step six the students' comments were cross-checked in relationship to the instructor's behaviors in this segment of tape. Most of Dr. Goodman's behaviors that the students referred to occurred when he was facing them directly and away from the screen.

The more detailed analysis of Dr. Goodman's behaviors did provide the means to document and display their regularity. It appears from this analysis and from the participant's comments that when Dr. Goodman is at the screen he presents the basic structural content of the course. In the composite position by the screen the information is developed, described, explained, illustrated, referred to, and questioned. Closer to the students the content is reflected upon in terms of the logical structure, applications and meanings to the students. The instructor and students responded to a change in or the meaningfulness of the instructional event more frequently when Dr. Goodman was in the position closest to the students or next to the screen (1b) talking and acting as he would in the position near the students. Students interpreted the composite of behaviors to determine what was taking place in the lesson, and what was important to know. (See Table 4 , The instructor's use of space.)

Dr. Goodman simultaneously monitored student behaviors to determine if they were attending to and understanding the instructional process. One cue he attended to in the "involvement loop" was the students' verbal and nonverbal responses to his questions and comments. When students did not respond, or an incorrect response was given, Dr. Goodman went through a corrective exchange to reinform and refocus the attention of the students. (Cooper, 1981) Dr. Goodman also has means of informing the students of the importance of the information presented. During what he referred to as the "Mathematical Punch Line", an example of the "subject matter

loop," a number of behaviors co-occurred that were interpreted by the students as "This must be important."

Implications for Ethnographic Research in Classroom Interactions

This study supports the findings of other ethnographic studies of school interactions and provides additional insights into the dynamics of classroom interactions. The teacher's verbal and nonverbal behaviors influence the instructional process and the subsequent interpretation of the instructional event (Byers and Byers, 1972; McDermott, et al., 1976). The participants' common recognition of the changing structure of the event is correlated with changes in use of space (Erickson, 1976). While the teacher orchestrates the event, it is an orderly, joint production of all class participants (McDermott, et al., 1976; Mehan, 1976; Erickson, 1978; Florio, 1978). Yet there is an underlying commonality that may be defined as a "school culture" (Florio, personal communication, April 1979) which cuts across age-grade levels. That is, the school culture has a unique pattern of discourse which is typically a teacher-directed evaluation act (Mehan, 1978; Sinclair and Coulthard, 1975).

This study suggests that there are various situationally determined and socially negotiated teacher and student roles in classroom interactions. The shifts in roles can be described and analyzed in terms of the focal activity and the moment to changes in the event. In examining these changes in the event and shifts in roles, the instructor's pronominal usage and use of space are reliable indicators of the social relationships.

This study also illustrates that increased understanding of the instructional event can be attained by including the students in the inquiry process. Students, with their experiences and their interactional competence in the "school culture", located and provided interpretations of functionally relevant behaviors that could not be discovered any other way. Based on the students locating and talking

about the instructor's co-occurring behaviors, the detailed systematic analysis of his use of space, gestures, instructional exchanges and changing roles was possible.

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APPENDIX

RESEARCH METHODS AND PROCESS

An Overview

The research process is comprised of three major parts:

1. Data Collection -- by using multiple, independent methods for gathering and analyzing information, meaningful patterns of behaviors are uncovered.

2. Data Integration -- the information gathered is interrelated and cross-checked. The outcome is a tentative descriptive model of the instructional event.

3. Data Verification -- The tentative or preliminary model is checked for consistency with the meanings and purposes of the participants as well as with other forms of research data. Adjustments are made where necessary.

The research process is illustrated in the flow diagram in Figure A-1. Data is collected by using various methods. The researcher looks for patterns of behaviors and develops hunches about the dynamics of the instructional event. The researcher continually seeks confirming or disconfirming information for the hunches. A descriptive model is developed, verified and refined.

A-1 Data Collection

Methods of collecting and analyzing data can include observations and observational notes, videotapes and videotape review sessions, interviews, post-course questionnaires and course documents. The procedures and examples of the methods are provided.

Observations and Observational Notes

Classroom observations serve to record the flow and patterns of behaviors as they occur. Some observations, or parts of observations, can be focused to check hunches. Hunches are tentative hypotheses regarding behavioral patterns or the structure of the instructional event. After a class session, the observational notes are reviewed and theoretical and methodological notes were added. Schatzman and Strauss (1973) provided the following definitions (p. 94):

> Observational notes are statements based on watching or listening to events in the class. They are behavioral records of who said or did what, what it was said or done, and under what circumstances.
>
> Theoretical notes are controlled attempts to derive meaning from observational notes. They can be interpretations, inferences, hunches, the development of new ideas or relationships to other sources of information.
>
> Methodological notes are instructions to oneself, reminders, questions to probe or self-criticism.

For an example, see Figure A-2.

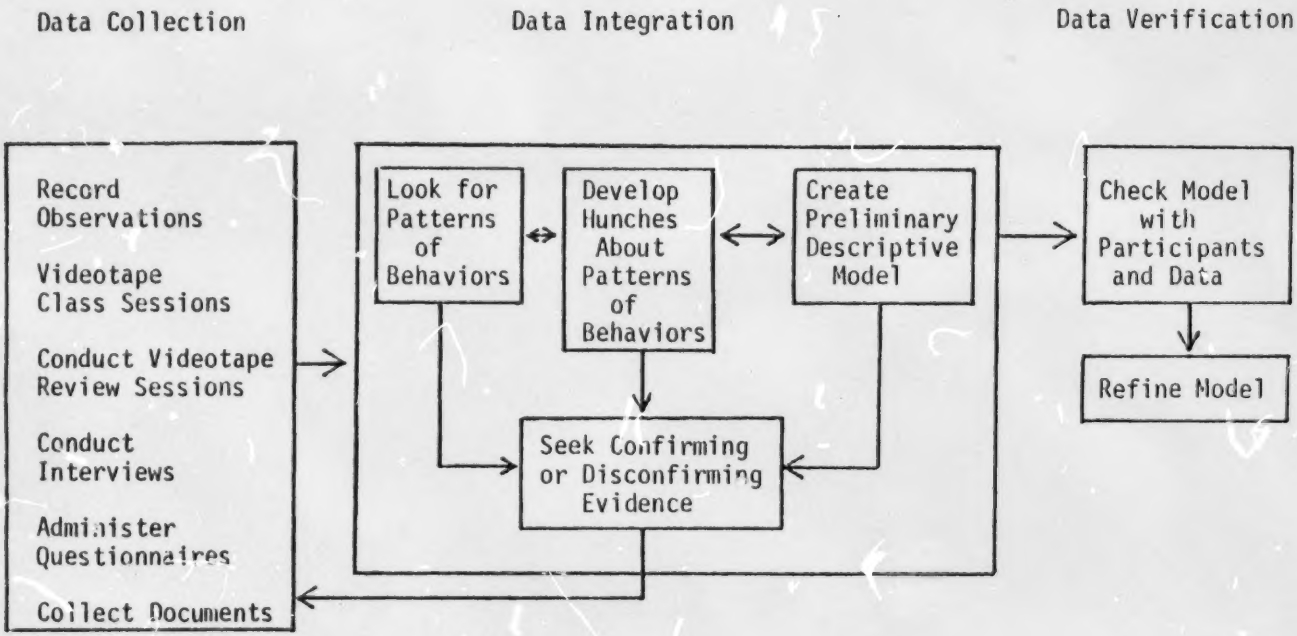


Figure A1 . Diagram of the research process.

Figure A-2.

Example of Observational Notes from the Systems Science Course, Fall, 1977

Friday, November 11, 1977:

Time	Technological/Method Notes	Observational Notes
1:45	Students appear relaxed. First time anyone has gone to the board. Is this typical?	(Students are talking in small groups, a few are reading the campus paper. One student begins to write an equation on the board, about half of the students attend to his work and a few are discussing the problem with him. Front seats are mostly filled, more scattered in back of room.)
1:46	The instructor's entrance is brisk, purposeful. Students seem aware of his presence, the noise level increases, one student begins joking with him... The instructor seems to be the brunt of the jokes. He seems to always have a witty (or corny) comeback.	(The instructor enters the room with a stack of materials. He's dressed casually in a pullover sweater, slacks. The talk among students seems to increase. A student comments on the instructor's beard which he felt needed a trim.) Oh, I'm getting it long since I'm getting ready for my Santa act...You know that one...'Come and sit on Santa's lap...' (The students chuckle and the instructor adds an...) ah-ha!
1:49	Management...Adds a touch of humor.	(Is there anyone who didn't get their hour exam back?...(One student walks to the front of the room.) Ah-ha... you repented and came back to the fold... (The instructor passes out tables of Z transform pairs...the students begin chatting to one another.)
	The instructor seems to be 'toying' with the authority role. Made his point	(A student asks, "What if I write on it?"...referring to the table... "Can it be written on?"...) If you

Time	Technological/Method Notes	Observational Notes
	but in a non-threatening way.	write on it you don't get to use it...(said in an almost mocking, sing-song voice)...It must remain in its original pristine condition...
1:53		(Passes out homework assignment row by row.)
	Transition into the lecture...Establishes a purpose for the subject matter	Are you ready?...We're behind one chapter...and you'll want to know the Z transform stuff...It will make the rest of the course and those that follow...bread and butter...
1:55	Goes to the pole to review the logic of the prior lectures. Checks with students by asking 'right'. Seems to be looking for cues of their understanding of the topic.	(The instructor retrieves his pointer and goes up to the transparency. Then he goes to stand by the window, leaning on the pole. He reviews the convolution summation property. It seems as if he's trying to make the process logical. Then asks) Right? ...(He looks around the room) Everyone see that?...(he continues to scan the room, looking at students.)
2:00	An attention getting strategy, seemed to be checking if students were understanding but not responding.	True or false...Pick one...(students answer in a chorus, "True.")
2:01	The presentation of the new subject matter begins with "We're excited now..." a joint event.	(Puts on a new transparency) "We're excited now...Right?...(Student, "I missed a part on the last transparency." The instructor puts on the prior transparency and refers to the part the student missed.)
2:05	A change of pace, new vigor, focusing students' attention to something important that is coming up...uses the screen to present the basic information, elaborates and builds upon the concepts by using an example which is worked out at the board.	I'm still excited..." (He goes to the screen and continues...) That is... $Y(z) = H(z)\ U(z)$...Wow!.. (He goes on to explain the equation, then says) ...Let's try an example (which is on the transparency. He goes behind the lab table and write out the example on the board. The students are watching, not taking notes.)
2:06	Focuses and gains attention through choice of words... "But wait a minute" and change of his rate, pitch	But...wait a minute...(He lowers his voice, speaks slower, then speeds up) Well, here's a new revolution...No... that's history (voice at a normal

Videotapes and Videotape Review Sessions

Videotapes (VT) provide a permanent visual and auditory record of the instructional event. To videotape, the camera is turned on prior to the entrance of the instructor into the classroom and shut off when he leaves. The camera is focused on the instructor with occasional scans of the class.

Individual videotape review sessions (VTRS) with the instructor and students help locate patterns of behavior that have meaning to participants. Often the VT recordings jog the memory of participants and bring to the foreground information that they are not consciously aware of while in the event itself.

The process of reviewing the videotapes with the instructor and the students is in three stages. The procedures were adapted from the work of Erickson and Shultz (1977). (See the Videotape Review Session Interviews for the Instructor, Figure A-3, and Students, Figure A-4.) The purpose of the first broad analysis of the videotape is to locate the major events and the transitions between those events as defined by the participants. The goal is to determine what activity is taking place in the class and when the activities changed. Locating changes is accomplished by asking the instructor or the student to stop the tape whenever things changed or when something different is going on. When the tape is stopped, the number on the counter of the videotape replay unit is recorded for later use in compiling and analyzing the data. The instructor or student is then asked what was happening. The directions are intentionally left open to obtain the participant's perspective on the events.

Following the viewing sessions, a chart is constructed with a continuous horizontal time line based on the counter of the replay unit. The location where each reviewer stopped the tape and the comments that were made are recorded on this chart. Viewing the chart provides a picture of the flow of activities in the class session from the participants' perspectives.

During the second stage of analysis, the chart is examined to locate where the reviewers stop the videotape to remark about a change in the flow of events. These junctures or boundaries between the major phases or contexts of the event are typically gradual. Co-occurring verbal and nonverbal behaviors provide information that a transition is about to occur. This information is in the form of changes in the kind and frequency of talk and actions, postural positions, and the use of space.

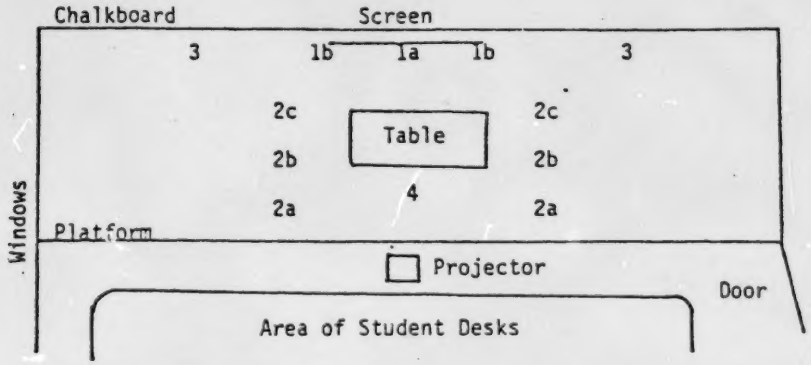
Transitions are of interest because, in McDermott's terms (1977), within any interaction there are moments during which participants struggle to maintain order in their relationship.

Students and the instructor are asked to examine and describe in more detail the behaviors that occur during these transitions. This information is compiled on a second chart which was an enlarged, blown-up view of the transitions noted in the first data collection.

Third, to understand further the specific communicative behaviors of the interactions, more refined analysis of the behaviors designated in the second stage is conducted independently by the researcher. Time is recorded on the videotapes by recording a digital clock in an upper corner. A transcript is made, marking two second intervals. The instructor's nonverbal behaviors were coded using the same intervals. The nonverbal behaviors can include the instructor's position in the room, gestures, and direction of gaze. The code is illustrated in Figure A-2, A-5, and an example of the coded behaviors and transcript is provided in Figure A-6.

TABLE 4 The instructor's use of space: A component of "instruction," a part of the descriptive model of the dynamics of the instructional process. (Cooper, 1979)

Dr. Goodman's use of space was interpreted by students. During instruction his use of space varied with what he was doing as he monitored, interpreted, and responded to students' behaviors.



Instructor's Use of Space, Winter Term, 1978

Position in the Room	Behaviors
At the screen (1a)	Presents basic structural content of course, selectively reads and points to information on screen. Looks at screen, asks rhetorical questions.
Closer to students (2 a, b, c)	Reflects on the logic of information, provides examples, asks questions which require and allow for an answer, uses colloquial phrases, models an experienced learner. Looks at students, increases frequency and intensity of gestures, varies volume and rate of speech. (Participants are more likely to stop the videotape to comment on the instructional process.)
By the screen (1b)	A composite of "at the screen" and "closer to students" behaviors. Develops, explains, illustrates, asks questions about meaning of concepts on the screen. Looks half the time at students and half the time at the screen. Students are more likely to respond to questions than if he is "by the screen."
At the chalkboard (3)	Explains difficult concepts, responds to students' questions, elaborates. Looks at the students and at the board. Similar to the "by the screen" behaviors.
By materials (4)	Organizes, passes out, collects or selects materials.

Figure A-3

VIDEOTAPE REVIEW SESSION

Instructor Form

I. Purposes:

The purpose of reviewing the videotape of a class session with the instructor is to gain insights into what is going on in the classroom which is meaningful from the instructor's "insiders" perspective. This will be accomplished in two separate interview sessions.

Session 1: The purpose of the first session is to uncover how the instructor clumps or categorizes and describes classroom events.

Session 2: The purpose of the second session is to record the way the instructor describes and interprets the classroom events. This may help in understanding his instructional decision making, the way he enacts his role as an instructor and the effects he anticipates his actions will have on student learning and behavior. For example:

1. What he was doing in a situation?

2. What did he see or hear that cued that behavior?

3. What were the anticipated results?

4. Why does he do that? (Look for cause and effect.)

5. What were the results as he perceives them?

The purpose of any interview is to maximize the flow of information; thus the instructor should do most of the talking and the situation should be kept informal.

II. Conducting Interviews

Session 1:

Purpose: The purpose is to record the instructor's perception of when things change or when something different is happening. The emphasis here is on how the class is segmented from the instructor's point of view. Later, this will be correlated with the students' perceptions of how the class is segmented.

Procedures: "First we will view the tape and I would like you to push the "pause" button whenever things change or something different is happening. Do you mind if I tape the session and take notes?"

The instructor is to be in control of his portion of the viewing session. The purpose is to gain insights into his frame of reference, his means of categorizing, and his description of the situation and its events.

When the instructor stops the tape, the number on the counter of the recorder, or the time, is recorded.

Correlations of the student-instructor data from Session 1: Before Session 2, conduct interview sessions with a sample of students to find out their perceptions of when things change. (See Student Videotape Review Session Form.) This information will be displayed and analyzed prior to Session 2. (See Videotape Procedures for how to display and analyze.) In this first stage of analysis, patterns which indicate concurrence among students and faculty that things were changing are sought. The segments of the tape that are stopped frequently by the students and instructor will be further analyzed in viewing Session 2.

Session 2:

Purpose: The purpose of this interview is to focus on what the instructor says and how he says it.

Cues of when things changed:

What cued the stopping of the tape?

What cues or student behaviors does the instructor mention?

What are the changes which signal the end of one situation and transition into another situation?

Observations of instructor behavior:

What does the instructor emphasize? (This may provide cues of his organization or model of teaching learning process.)

What are some of his behaviors while viewing this videotape--how does he sit, does his pattern of speaking change?

When do his non-verbal behaviors change?

Procedure: "This time we'll look at the segments of the tape which you and the students stopped to comment on things that were changing. (The instructor can look at the graph which illustrates key segments.) We'd like to explore in more detail what was happening. I'd like you to push the "pause" button whenever:

1. you do something which helps student learning;
2. or that might get in the way of student learning.

I may also stop the tape if I have some questions."

Questions might be:

1. "What were you doing in this situation?"
2. "What did you see or hear that cued you to do that?"
3. "What were the results you anticipated?"
4. "Why did you do what you did?" (Looking for his perception of causes and effect)
5. "What were the results of what you did?"

The numbers are recorded and later correlated with student comments.

Figure A-4

VIDEOTAPE REVIEW SESSION

Student Form

I. Purposes:

The purpose of reviewing the videotape of a class session with the student is to gain insights into what is going on in the classroom which is meaningful from students' "insiders" perspective. This will be accomplished in two separate interview sessions.

Session 1: The purpose of the first session is to uncover how the student clumps or categorizes and describes classroom events.

Session 2: The purpose of the second session is to record the way the student describes and interprets the classroom events. This may help in understanding behaviors focused on and the interpretation of those behaviors.

The purpose of any interview is to maximize the flow of information; thus the students should do most of the talking, and the situation should be kept informal, yet stick to the purpose of the interview.

II. Conducting Interviews:

Session 1:

Purpose: The purpose is to record the student's perception of when things are changing or when something different is happening. The emphasis here is on how the class is segmented from the student's point of view. Later, this will be correlated with the instructor's perceptions of how the class is segmented.

Procedures: Introduction to the student. Purpose of the study. The purpose of this study is to learn more about the instructional process in the college classroom. We want to better understand what goes on in the college classroom that has an effect on student learning.

Methods: "In this study a variety of information gathering techniques are being used. Interviewing the instructor about the course, observe and audiotape class sessions, videotaping some

classes and asking the instructor and students to individually review the videotape and using a post course questionnaire are some of the methods."

"First we will view the tape and I would like you to push the "pause" button whenever things change or something different is happening. Do you have any questions? Do you mind if I take notes? This will enable me to clarify and fill in ideas later."

The directions are intentionally left open to obtain the students' perception of the class events. The student is to be in control of his portion of the viewing session. The purpose is to gain insights into his frame of reference, his means of categorizing and his description of the situation and its events.

When the student stops the tape, the number on the counter of the recorder, or time, is recorded.

Correlations of student-instructor data from Session I: This information will be displayed and analyzed prior to Session II. (See Videotape Procedures for how to display and analyze.) In the analysis patterns which indicate concurrence among students and instructor that things were changing are sought. The segments of the tape that are stopped frequently by the instructor and students will be further analyzed in Viewing Session II.

Session 2:

Purpose: The purpose of this interview is to focus on what the student says and how he says it.

Cues of when things changed:

What cued the stopping of the tape?

What cues or instructor behaviors does the student mention?

What are the changes which signal the end of one situation and transition into another situation?

Effects of situation where student stopped the tape:

What were the effects of the situation on the student's learning?

What did the student do in response to the cues or behaviors? (What did he think, how did he act or respond?)

How does the student perceive the instructor's behaviors in this situation? Are there changes in the student or instructor behaviors and interaction in the class session over time?

What does the student emphasize?

Procedure: "This time we'll look at the segments of the tape which the instructor and students stopped the tape to comment that things were changing. (The student can look at the graph which illustrates the point.) I'd like to explore in more detail what was happening. I'd like you to push the "pause" button whenever:

1. the instructor does something which helps your learning;
2. or that might get in the way of your learning.

I may also stop the tape if I have some question."

Questions might be:

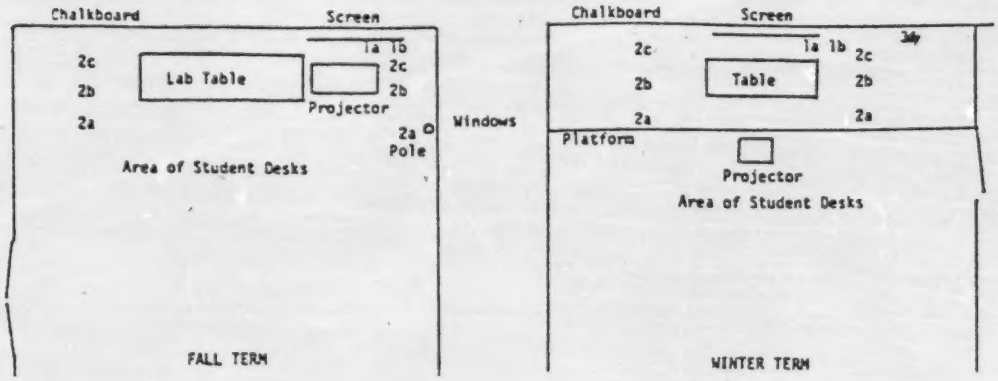
1. "What were you doing in this situation?"

2. "What did you see or hear that cued you to do that?"

3. "How did this affect what you did next?"

The numbers are recorded and later correlated with instructor's comments.

CODING OF CO-OCCURRING BEHAVIORS



Position in the Room

P_1 = screen
P_2 = front of platform
P_3 = chalkboard
P_4 = table/overhead projector (refers to right side of room unless specified with an L)

Body Position

B_1 = facing students
B_2 = at angle to students
B_3 = side to students
B_4 = back to students
B_5 = leaning on table, wall
B_6 = leaning to reach material

Direction of Gaze

DG_1 = at students
DG_2 = at acreen
DG_3 = at chalkboard
DG_4 = at materials

Gestures

G_1 = arms to side/below waist
G_2 = arm extended, pointing at or above waist (right hand unless specified as left)
G_3 = both arms up/extended at or above the waist
G_4 = handling materials (transparencies, papers, chalk)
G_5 = hands to glasses, hair, ear, face
G_6 = gestures with hands
G_7 = clasps hands
G_8 = writing or writing-tracing motion/erasing

Figure A-5. Coding of co-occurring behaviors.

"Mathematical Punch Line" Example 1
Transcript and Co-occurring Behaviors

Time	Text	DG	G	B	P
6:52	Just look at this	2	1	3	1a
:54	thing...	1	5	1	1a
:56	...		1		3b
:58	Let me raise it up for you a little	4	4		4b
7:00	bit...	2	1	3	
:02	...Look at the form of			4	3a
:04	it...We have the Z transform of		7		3b
:06	output...Right?...is equal to something	2	2	2	1a
:08	here...times the Z				
:10	transform of the input...	1			
:12	Times the Z transform of inputs...		3	1	3c
:14	Right?...Now...how did we know how to		6		3b
:16	relate the outputs to inputs				3a
:18	before?...What's the type of relationship been				
:20	before...				
:22	(student responds) Yeah...convolution				
:24	summation...which is a				
:26	colossal pain in the neck...				
:28	True...Colossal...				
:30	Now...what's the relationship now	2	2	2	

Interviews

Interviews provide the opportunity to ask participants general and specific questions and to probe when comments are made or when questions are asked. There is an opportunity to direct the flow of information in order to clarify, supplement, support, or correct impressions. The instructor interviews can be informal and typically are based on questions that are raised during class observations or based on the review of the videotapes. Informal student interviews also often occur after a videotape review session.

B-Id Post Class Questionnaire

A post class questionnaire is a written list of questions which is used to obtain a sample of student opinions concerning the instructional process in the classroom. The purpose is to collect some basic information on what the instructor is to help or hinder student learning and motivation. The information serves to confirm or disconfirm other sources of information. An example of the Post-Course Questionnaire appears in Figure A-7.

Documents

Documents are written records which are developed or produced by participants and relate to the management or instruction of a class. Any written materials that can be supplied by the instructor, students, or secretary can be considered as course documents. They can include the course outline, textbooks, the instructor's transparency sheets, tests, homework assignments and handouts.

Documents can reflect an underlying organization which is not always apparent during early stages of the study. They can serve as evidence for instructor decision-making which frequently can be pursued to understand the meaning of classroom interaction. Documents can provide information that cannot be obtained through observations or from a particular participant. In addition, they serve as a permanent record of communication between the instructor and student.

B-II Data Integration

The process of data integration involves interrelating information that is collected and analyzed. This integration process is concurrent with the information gathering process. Information is continually reassessed and concepts were refined. As the integration process procedes, hunches take form, questions are refocused, and a working descriptive model which seems to account for behaviors is developed. Cross-checks are made on the frequency and distribution of patterns of behaviors that are designed as having meaning to the participants or that are observed and appeared to influence the instructional process. Relationships among patterns of behaviors are identified. These relationships served to link the components of the working model.

B-III Data Verification

A descriptive model is verified if it adequately represents the system under study and is consistent with the meanings and purposes of the participants. A descriptive model should account for the salient behaviors in a classroom and how these behaviors are interrelated to form an instructional event.

Figure A-7

Post Course Questionnaire

Major_____

How did you select this class?_____

_____

Every instructor has relatively strong and weak points. I would like like to find out what I do and what specific effects I have on you. Please give examples of what I do and how it effects you in the table below. (Use reverse side of this sheet if needed.)

What did I do:	Specific Examples	Specific Effects on You
to encourage you to want to learn?		
to help you learn and remember?		
to decrease you desire to learn?		
to get in the way of your ability to learn and remember?		

ARE YOU GENERALLY SATISFIED WITH THIS CLASS? PLEASE EXPLAIN. ANY OTHER COMMENTS ARE WELCOME. (Please use the other side of this sheet.)

The soundness of the descriptive model can be documented by:

(1) Corroborative information that is obtained from different sources and by different data gathering methods.

(2) The instructor's examination of the descriptive model to determine if it is consistent with this "model of actions" which was used in making decisions about behaviors in the classroom. The students examination of the descriptive model to match their interpretation of the events.

Documentation of the Descriptive Model of Interactive Behaviors in a Classroom

1. Corroborative Information

There were two major types of corroborative information: (1) information can be collected from the participants via interviews, videotape review sessions, and questionnaires; and (2) information can be collected by the researcher(s) via observations and analysis of videotapes. While it was necessary to document that the different sources of information and different methods of collecting information provide convergent findings, Campbell and Fiske (1959) state that convergent findings alone are insufficient. They deal with the concern for validity in their seminar paper on convergent and discriminate validation. They compare reliability and validity, and convergent and divergent validity. Both reliability and validity require agreement between measures. Concerns for reliability are related to attaining the same results when using the same data gathering method. Validity is the concern for attaining the same results when using different methods. This definition of validation is essentially the definition of convergent validity: "A confirmation by independent measurement procedures". While convergent validation is necessary, Campbell and Fiske are concerned that discriminate validation is also required. That is, when different methods are used to record or measure the same thing, the same results are attained; when different methods are used to measure different things, the results differ.

For example, if the participants report and the researcher finds patterns of behaviors that have meaning within the social context, these patterns of behavior should be consistently and repeatedly identified when using various methods of gathering information. Yet, if the social context were to change, the same patterns of behaviors should not be reported or observed (although there will be some overlap of behaviors between events).

Cross-Check of Findings -- To cross-check the behavioral patterns and the meanings of those behaviors to the participants in the classroom, two segments of videotape of equal length to the segment of videotape that was thoroughly anzlyzed are selected. These two segments are analyzed and compared to the original segment in terms of variables such as the instructor's position in the room, gestures, body position, direction of gaze and discourse. One segment should be selected because it is different from the original segment in terms of participant comments. The second segment should be chosen because it was similar to the original segment. Patterns of behaviors are cross-checked for similarities and differences.

2. Verification with Instructor

The soundness of the descriptive model is verified by asking the instructor if the model of the instructional process is consistent with their "model of actions" which were used in making decisions about the behaviors in the classroom.